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DMA176L
Ref. 0139179L

Emergency Locator Transmitter

INSTALLATION MANUAL
OPERATION MANUAL

KANNAD 406 AS

P/N : S1823502-02	ELT, KANNAD 406 AS (BNC)
P/N : S1823502-03	ELT, KANNAD 406 AS (TNC)
P/N : S1820514-14	WATER SWITCH SENSOR
P/N : S1820511-02	MOUNTING BRACKET, AS
P/N : S1820511-03	CARRY-OFF BAG, AS
P/N : S1820511-03	CARRY-OFF BAG, Short

Users are kindly requested to notify **KANNAD** of any discrepancy, omission or error found in this manual.

Please report to our customer support:
E-mail: support.sar@kannad.com
Tel.: +33 (0)2 97 02 49 00

RECORD OF REVISIONS

REV. Nb	REVISION DATE	INSERTION DATE	BY
01			
02			
03			
04	MAR 18/2004	MAR 18/2004	J. S.
05	JAN 17/2005	JAN 17/2005	J. S.
06	JUN 27/2005	JUN 27/2005	J. S.
07	NOV 08/2006	NOV 08/2006	J. S.
08	FEB 01/2008	FEB 01/2008	J. S.
09	JUN 23/2008	JUN 23/2008	J.S.
10	APR 28/2010	APR 28/2010	J.S

RECORD OF REVISIONS

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INTRODUCTION

The instructions in this manual provide the information necessary for the installation and the operation of the KANNAD 406 AS ELT.

Servicing instructions are normally performed by shop personnel.

For servicing and maintenance instructions, refer to CMM 25-63-01.

FOR REGULATORY REQUIREMENTS, PLEASE CONSULT YOUR NATIONAL AVIATION AUTHORITY.

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SYSTEM OVERVIEW

1. COSPAS-SARSAT System

A. Description

Launched in the early eighties by the four founder countries (Canada, France, Russia, USA), the COSPAS-SARSAT system provides satellite aid to search and rescue (SAR) operations for maritime, aeronautical and terrestrial vehicles anywhere in the world.

It uses distress beacons fitted on mobiles and a constellation of LEO and GEO satellites which relay the 121.5 / 243 MHz signals and process the 406 MHz signal to ground stations (LUT) where the beacon positions are determined (with a precision of 10 NM with 121.5 / 243 signals and less than 2 NM with 406 signals).

Several types of beacons are designed to match the various applications of the COSPAS-SARSAT system:

- EPIRB (Emergency Position Indicating Radio Beacon) for maritime applications.
- ELT (Emergency Locator Transmitter) for aeronautical applications.
- PLB (Personal Locator Beacon) for land expeditions.

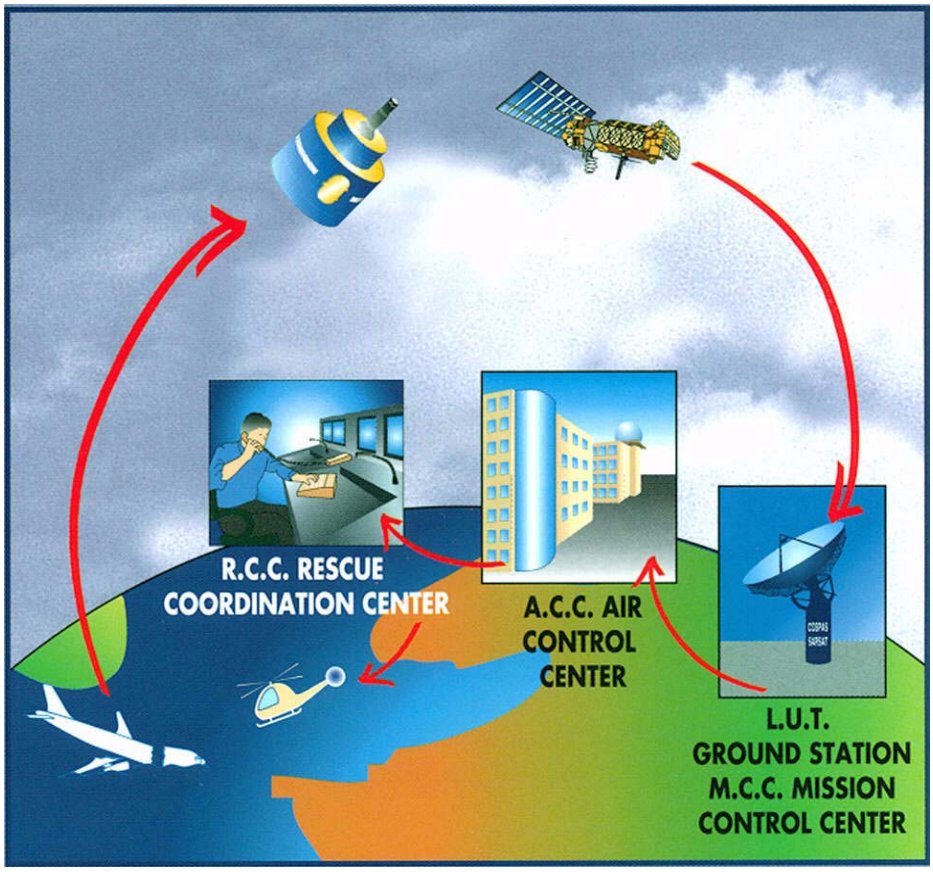


Figure 1: COSPAS-SARSAT System

B. World coverage with the COSPAS-SARSAT system

The major improvement is the use of the COSPAS-SARSAT system for processing aeronautical emergencies.

The difference with the 121.5 / 243 MHz is that the 406 MHz transmission carries digital data which enable the identification of the aircraft in distress and facilitate SAR operation (type of the aircraft, number of passengers, type of emergency).

The 406 MHz message is transmitted to the COSPAS-SARSAT satellites. This message is downloaded to one of the 64 ground stations (44 LEOLUTs and 20 GEOLUTS).

The aircraft is located by Doppler effect by the LEO satellites with a precision better than 2 NM (4 km) at any point of the earth.

C. Environmental improvements of ELTs

The certification of an ELT includes a range of severe mechanical tests:

- resistance to flame;
- impact and crush tests;
- resistance to shocks;
- watertightness;
- antideflagration;
- extreme temperatures (-20°C to 55°C for more than 48 hours).

2. KANNAD 406 AS Presentation

The KANNAD 406 AS is composed of:

1. a transmitter;
2. an optional mounting bracket (2a) and locking pin (2b);
3. a float;
4. an auxiliary antenna;
5. a water switch sensor (option);
6. a "Programming Dongle" for pin-programming function (option).

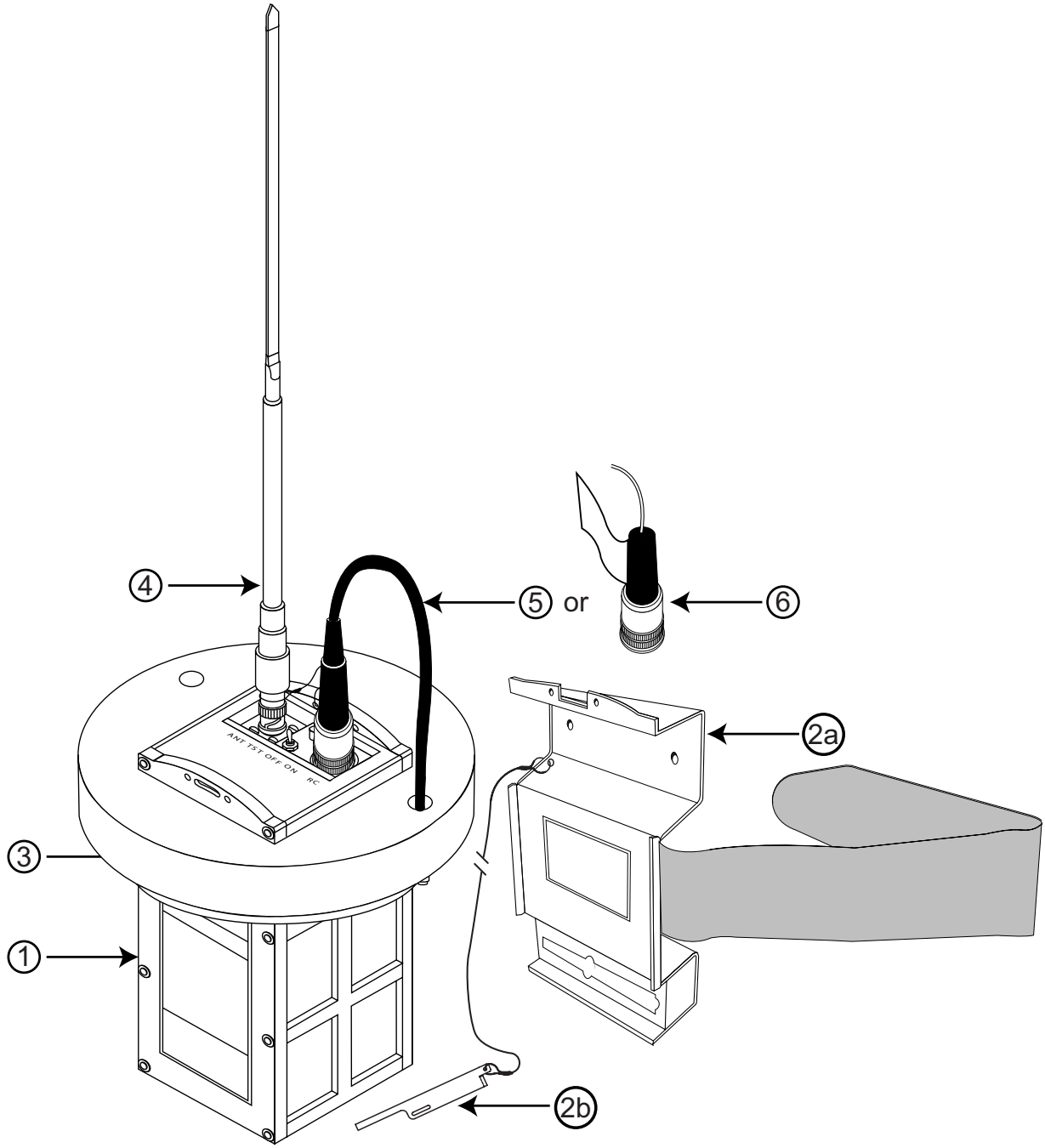


Figure 2: KANNAD 406 AS presentation

3. Design features

A. General

KANNAD 406 AS is a survival ELT intended to be removed from the aircraft and used to assist SAR teams in locating survivors of a crash.

KANNAD 406 AS is a standalone equipment equipped with an auxiliary antenna and activated manually by survivors or automatically by a "Water Switch Sensor" when in contact with water.

B. Mechanical design

KANNAD 406 AS is made of moulded plastic with excellent mechanical resistance (ASA/PC, light yellow colour).

The housing is designed to be easily taken in one hand. A tether is supplied to tie the ELT to a liferaft.

KANNAD 406 AS is fitted with a floating collar to enable the ELT to float upright if used in water. This floating collar can be removed if the ELT is attached to a life-raft or any buoyant part.

Important notice: Unlike all other KANNAD 406 ELTs (automatic), KANNAD 406 AS (survival) is *not* fitted with a G-Switch (shock detector).

Figure 3: KANNAD 406 AS

SYSTEM FUNCTIONAL DESCRIPTION AND OPERATION

1. Transmitter

The KANNAD 406 AS is designed to transmit on three frequencies (121.5, 243 and 406 MHz).The two basic aeronautical emergency frequencies (121.5 and 243 MHz) are mainly used for homing in the final stages of the rescue operations. The 406 MHz frequency is used by the COSPAS-SARSAT satellites for precise pinpointing and identification of the aircraft in distress.

Once activated, the transmitter operates continuously on 121.5 and 243 MHz. The output power is 100 mW on each frequency.

The modulation is an audio frequency sweeping downwards from 1420 Hz to 490 Hz with a repetition rate of 3 Hz.

During the 24 first hours of operation, a signal is transmitted on 406 MHz every 50 seconds to the COSPAS-SARSAT satellites. The output power on 406 MHz is near 5W.

2. Controls

The following controls are to be found on the ELT front panel (from left to right):

1. 3-position switch ARM/OFF/ON;
2. Visual indicator (red);
3. DIN 12 connector for dongle or programming equipment connection;
4. BNC or TNC connector for the antenna.

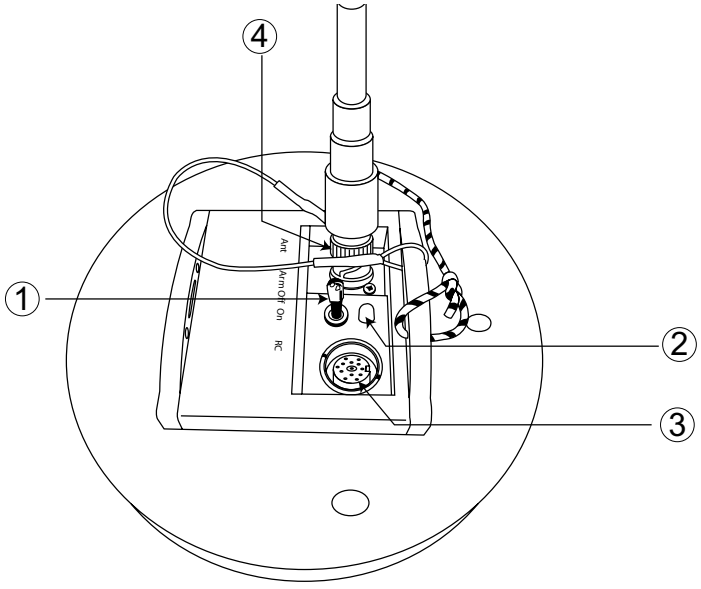


Figure 101: Front Panel

3. Working mode information

The visual indicator gives an indication on the working mode of the beacon:

- after the self test, a series of short flashes indicates the self test failed, one long flash indicates that the self test is OK.
- in operating mode, periodic flashes during 121,5 / 243 transmission and one long flash during every 406 MHz burst (1 every 50 seconds).

A buzzer gives aural information on the working mode of the beacon:

- continuous tone during self test;
- 2 beeps per second during 121.5 / 243 transmission;
- silence during 406 transmission.

4. Autonomy

The energy is provided by a battery pack composed of 3 $LiMnO_2$ D cells (See pages 103 & 602 for Kit battery reference).

Lithium cells, lithium batteries and equipment containing such batteries are subjected to regulations and classified under class 9 as from 1st of January 2003.

The autonomy of the 121.5/243 transmission is close to 100 hours at -20°C with new batteries.

In the worse conditions possible, a distress is pinpointed 5.5 hours maximum after the ELT activation and the position is subsequently updated (if necessary) every 2 hours.

As it is therefore preferable to keep the battery power for 121.5/243 MHz homing frequency transmission for the rescue operations, the 406 MHz transmission is deliberately stopped after 24 hours to extend the 121.5/243 transmission for as long as possible.

The transmitter battery expiry date is fixed at 6 years after manufacturing. If no activation of the ELT occurs during the battery lifetime, it shall be replaced every 6 years(see note below).

NOTE: The useful life time of batteries is twelve (12) years. To be in compliance with FAR regulations, they have to be replaced every six (6) years when 50 percent of their useful life has expired.

5. Technical Specifications

TYPE
- Three-frequency ELT (121.5 / 243,0 / 406,025 MHz)
- Survival
- COSPAS-SARSAT Class II (-20°C to +55°C)

406 MHz TRANSMISSION
- Frequency: 406.025 MHz ±2 kHz
- Output power: 5W (37 dBm ± 2 dB)
- Modulation type: 16K0G1D (Biphase L encoding)
- Transmission duration: 440ms (short message) every 50 sec.
- Autonomy: Over 24 hours at -20°C

121,5/243 MHz TRANSMISSION
- Frequencies: 121.5 MHz ± 6 kHz 243.0 MHz ± 12 kHz
- Output power:100 to 400 mW (20dBm to 26 dBm) for each frequency
- Modulation type: 3K20A3X
- Modulation rate: between 85 and 100%
- Frequency of modulation signal: 1420 Hz to 490 Hz with decreasing sweep
- Autonomy: Over 48 hours at -20°C

CONTROLS
- ARM / OFF / ON switch
- Red visual indicator
- BNC antenna connector (S1823502-02)
- TNC antenna connector (S1823502-03)
- DIN12 connector for remote control, pin programming option and water switch sensor option
- Buzzer

BATTERY
KIT BAT300, P/N : S1820516-99
3 x $LiMnO_2$ D type cells for transmitter power supply
Replacement every 6 years

HOUSING
Material: Molded plastic
Color: Yellow
Tightness: O-rings
Flotation: Yellow foam Ø160mm ± 5mm (6.3 In. ± 0.196 In.)
Transmitter dimensions:
- 172 mm x 82 mm x 82 mm (6.77 x 3.228 x 3.228 In.)

Overall dimensions (antenna deployed):
- max 590 mm x 160 mm x 160 mm (23.228 x 6.3 x 6.3 In.)

Packed dimensions (in carry-off bag):
- Carry-off bag AS:
  - 332 mm x 180 mm x 180 mm (13.07 x 7.086 x 7.086 In.)
- Carry-off bag Short:
  - 290 mm x 180 mm x 180 mm (11.417 x 7.086 x 7.086)

Stowed dimensions (mounting bracket):
- 300 mm x 162 mm x 160 mm (11.81 x 6.377 x 6.3 In)

Weight (incl. Auxiliary antenna, floating collar and batteries):
- typical 1180 g / max 1250 g (2.6 lb / 2.75 lb)

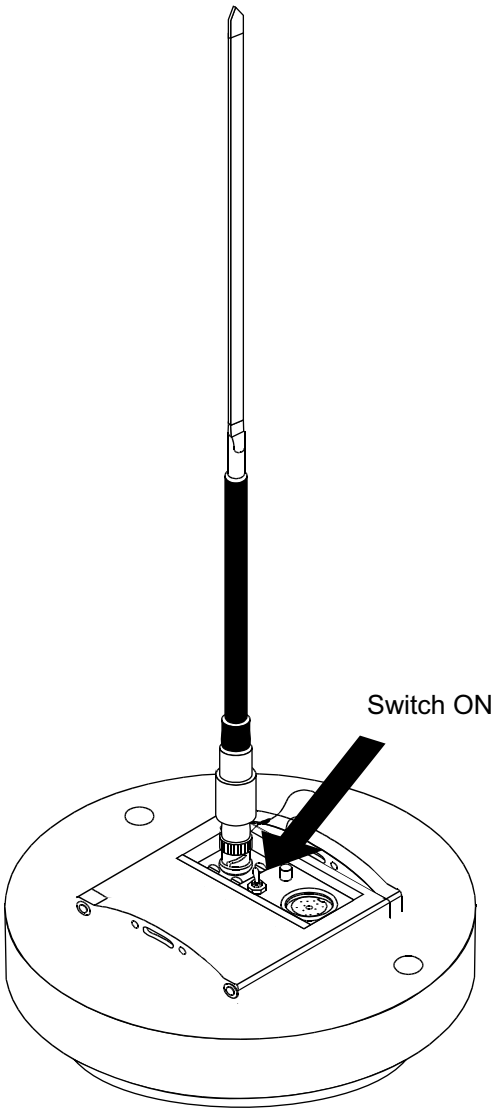
Weight (mounting bracket):
- typical 165 g / max 175 g (0.36 lb / 0.38 lb)

ENVIRONMENTAL CONDITIONS
RTCA DO-160D Ch. 4 to25
[ED62]XBA[ED62][RCC1]AWXXXXZXXX
ZWL[(A1)(A2)(A3)XX]XXA
Note: Ch. 6, 9, 10 according to DO-160C.

QUALIFICATIONS
ETSO-2C91a & ETSO-2C126 (EUROCAE ED62)
TSO-C91a & TSO-C126 (RTCA DO183 & DO204)

6. Manual Activation

- Switch to "ON" position.

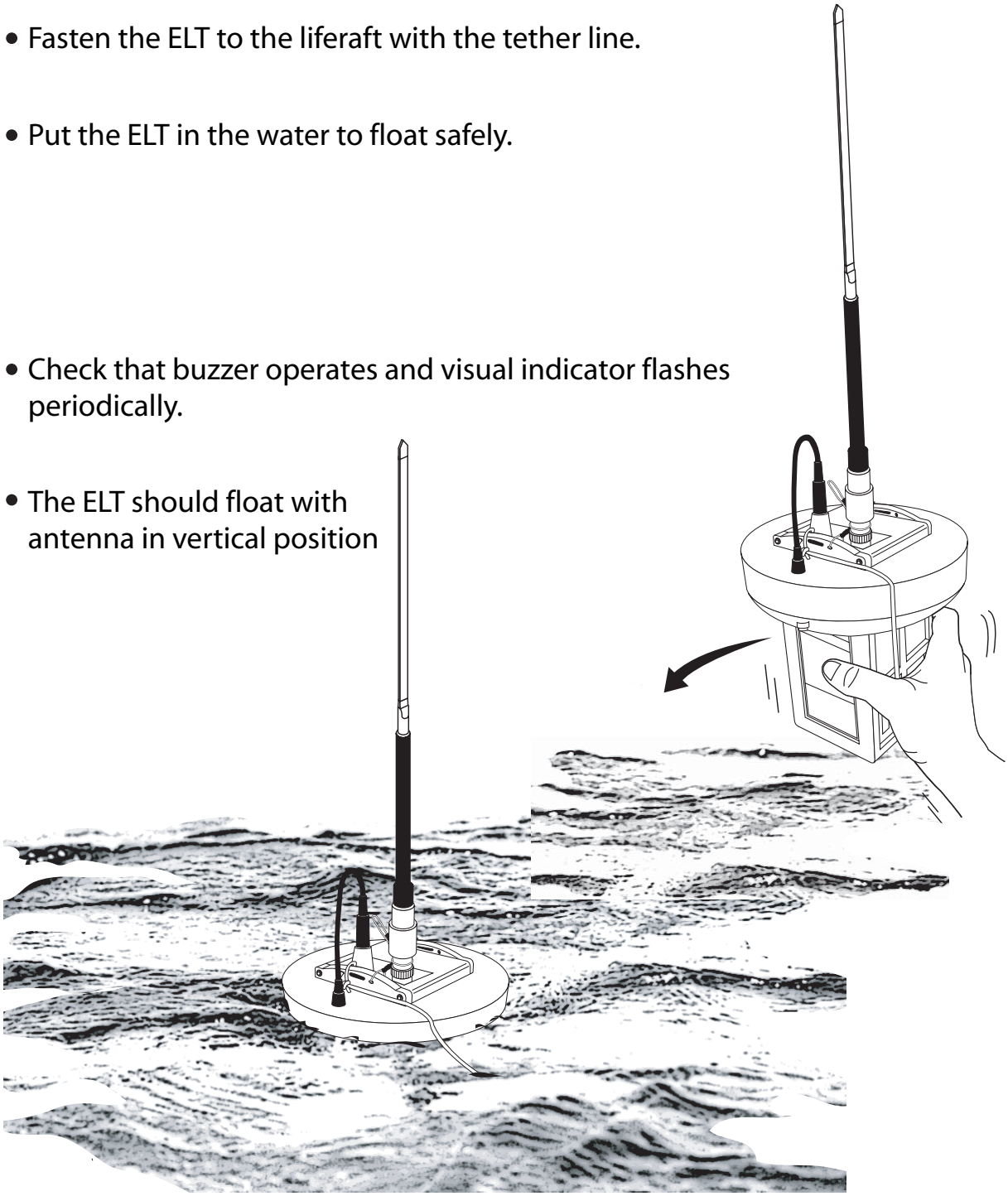


- Try to keep the antenna vertical.
  - The ELT starts with the self-test sequence.
  - 121.5 / 243 MHz transmission starts immediately after the self-test.
  - 406 MHz transmission starts after 50 seconds.
  - During transmission, buzzer operates and visual indicator flashes periodically.

7. Water Switch Activation

The ELT switch must be in the "ARM" position and the Water Switch Sensor must be connected.

- Fasten the ELT to the liferaft with the tether line.
- Put the ELT in the water to float safely.
- Check that buzzer operates and visual indicator flashes periodically.
- The ELT should float with antenna in vertical position



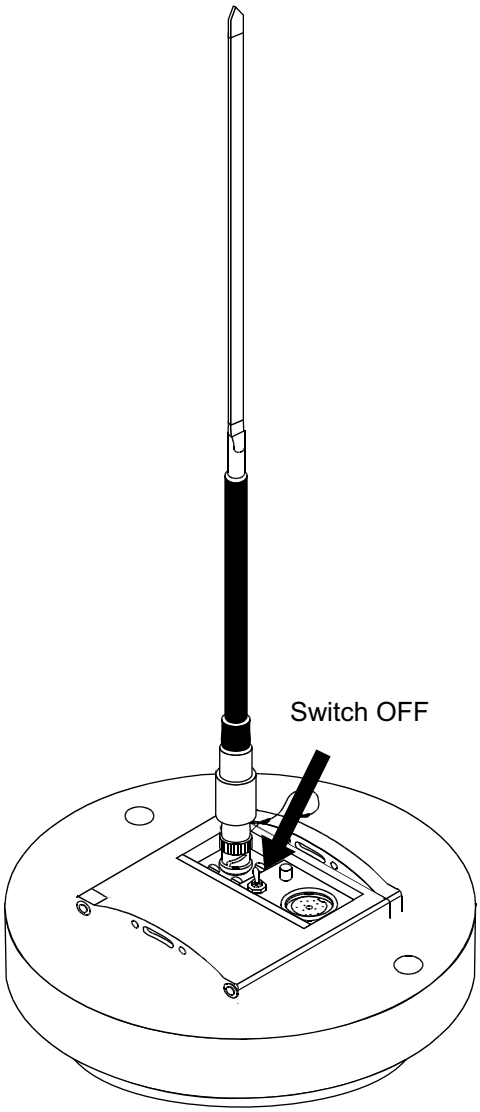
8. Reset

In case of unintentional activation, the ELT can be stopped manually.

No transmission must be interrupted unless every means are used to contact and inform the Air Traffic Controller of this action.

Important notice : As 406 MHz transmission is effective 50 seconds after the ELT activation, if it is reset within this delay, no further radio contact will be necessary.

- Switch to " OFF ".



INSTALLATION / REMOVAL

1. Registration and Programming

The ELT must be registered prior to installation on board.

The registration card available from the local registration authority must be completed and returned to this authority.

The "Programming Datasheet" (DIM0300) must be completed and returned to your distributor.

Any change of ownership shall also be declared and registered with the local registration authority and with the distributor.

The KANNAD 406 AS is fully compatible with the four programming protocols defined by the COSPAS-SARSAT C/S G005 document:

- Serialised Number.
- Aircraft 24 bit Address (the same as MODE S ATC or TCAS).
- Aircraft Operator Designator + serialised number up to 4096.
- Aircraft Nationality and Registration marking (Tail Number). This identification consists of up to 7 alphanumeric characters.

Programming of the ELT can be carried out either:

- by KANNAD or the distributor (order must include programming details).
- in the shop with programming and test equipment (PR600 and KANNAD software).
- on board the aircraft with a programming equipment or programming dongle.

This operation takes less than 2 minutes and does not need any hardware operation. The identification is simply downloaded to the ELT when connected to the KANNAD programming equipment via the DIN 12 connector.

A. Pin programming option

The KANNAD 406 AS offers pin-programming capabilities to facilitate maintenance operations especially in the case of removals and/or replacement.

A special DIN 12 connector with a Serial Memory Module (called "Programming Dongle") is connected to the ELT when installed on board. This Programming Dongle contains the identification information of the aircraft and remains on board the aircraft. When an unprogrammed ELT is installed and connected to this Programming Dongle and the "ELT" is switched to "ARM", it automatically

updates its own memory with the identification data contained in the Programming Dongle memory.

When the ELT is removed from the aircraft, it keeps its identification data.

For maintenance purposes, it is possible to delete the identification information of the ELT by connecting a "Maintenance Dongle" to the ELT. Any accidental transmission with this "maintenance dongle" will not involve SAR operation as the identification code transmitted is recognised by COSPAS-SARSAT as "not on board".

When a maintenance dongle is connected:

- Country code is ***227*** (France).
- Protocol is **Test**.
- Identification number is ***SI + 5 digits*** (the last 5 digits of CSN number) or ***K + 6 digits*** (the 6 digits of the CSN number).

If the pin programming option is selected by the operator, the following equipment are required:

- a "Programming Dongle" on each aircraft;
- a "Maintenance Dongle" on each ELT spare.

Figure 201: Maintenance Dongle

2. Installation

"The location of the ELT shall be chosen to minimise the potential for inadvertent activation, damage by impact, fire and contact by passengers or baggage" (RTCA DO-183)

"The ELT must be attached to the aircraft in such a manner that the probability of damage to the transmitter in the event of a crash impact is minimised." (FAR 91.207)

The ELT shall not be installed less than 60 cm (2 ft) from a magnetic field sensor.

The KANNAD 406 AS can be either packed in a carry off bag or installed on a mounting bracket.

A. Installation with Carry-Off Bag

The KANNAD 406 AS is packed in a carry off bag with 3 handles for easy handling.

(1)Packing instructions

- Check that the switch is in the "OFF" position ("ARM" if the beacon is fitted with a water switch sensor).
- Slide the antenna though the hole provided in floating collar.
- Put the ELT with the antenna downwards so that it fits on lower part of the wedging foam.
- Turn it ¼ turn so that the antenna fits between top and bottom wedging foam.
- The ELT should wedge into place.

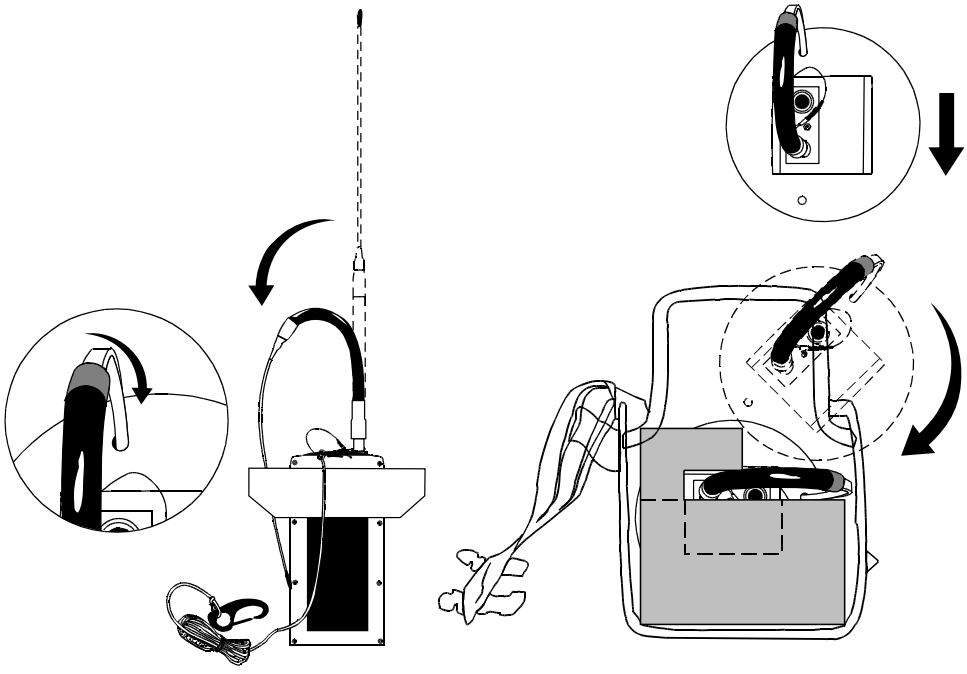


Figure 202: Packing Instructions

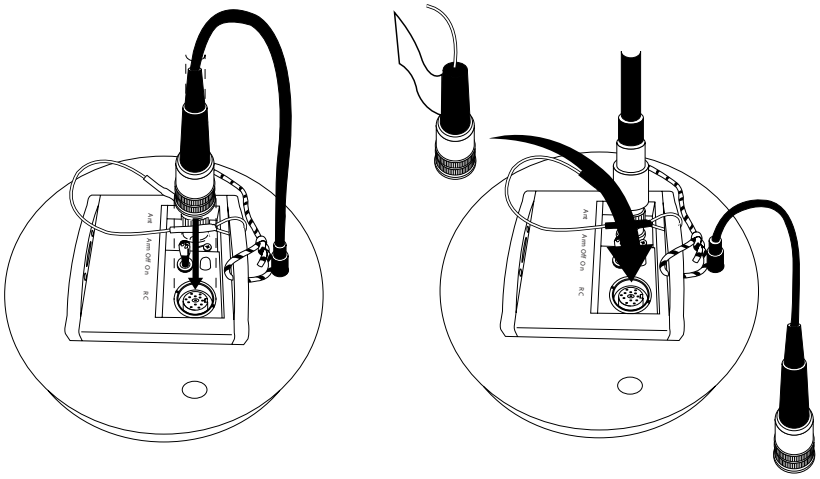
B. Installation with mounting bracket

(1)Bracket installation

- Determine the location of the ELT on board according to FAR/RTCA recommendations.
  CAUTION: Do not install the ELT in a location directly exposed to the sun.
- Drill 3 holes Ø 5,5 mm in the aircraft structure according to "Drilling mask" page 503 of this document.
- Fix the bracket with the 3 screws and nylstop nuts or 3 rivets.

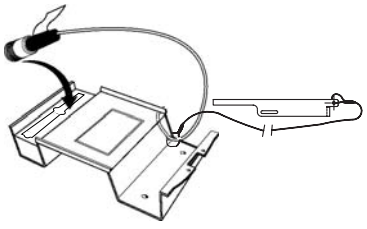
(2) ELT installation

- Check that the ELT identification label matches the aircraft tail number.
- If the mounting bracket is fitted with a Programming Dongle (P/N S1820514-01), remove the Water Switch Sensor connector and connect the programming dongle to the ELT.



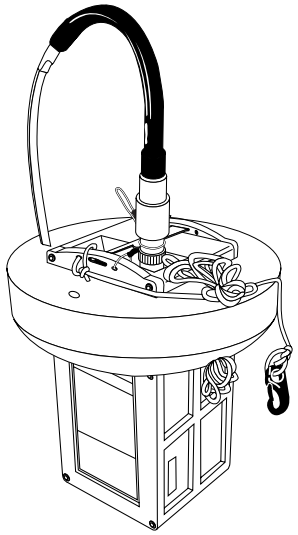
- Perform a Self-test (see paragraph "SELF-TEST").
- If test result is OK, switch back to "OFF".

- Disconnect the Programming Dongle (if applicable) and stow it in the compartment designed to this effect inside the bracket.

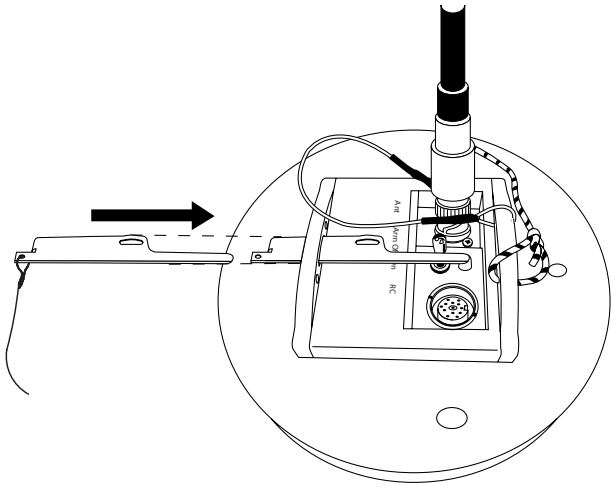


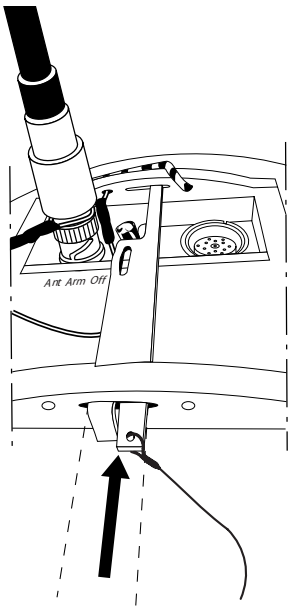
- Reconnect the Water Switch Sensor (if applicable).

- Slide the antenna through the hole provided in the floating collar.

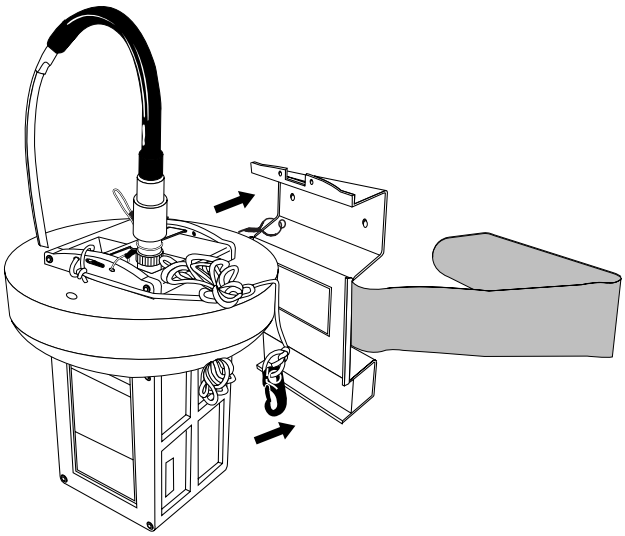


- Slide the locking pin as shown hereunder.

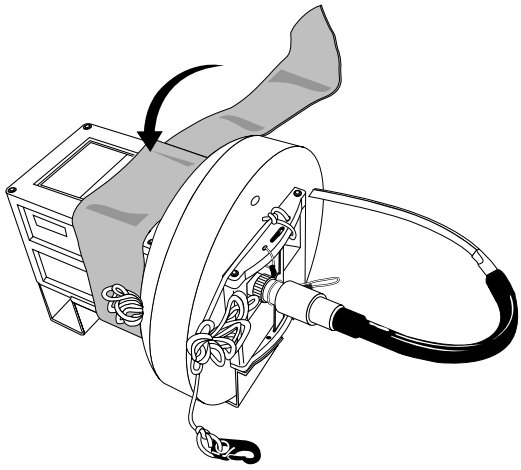


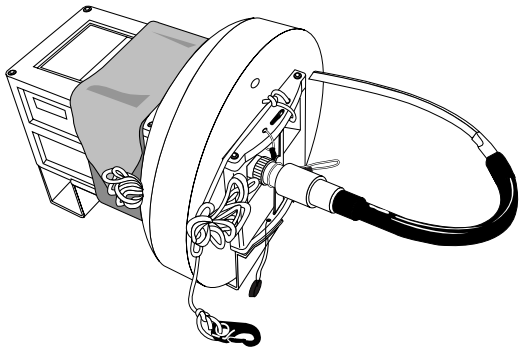


- Install the ELT on the mounting bracket with "lower cover" facing the mounting bracket.



- Fasten the Velcro® strap tightly.





- If the ELT is fitted with a Water Switch Sensor (P/N S1820514-14), switch the ELT to the "ARM" position.

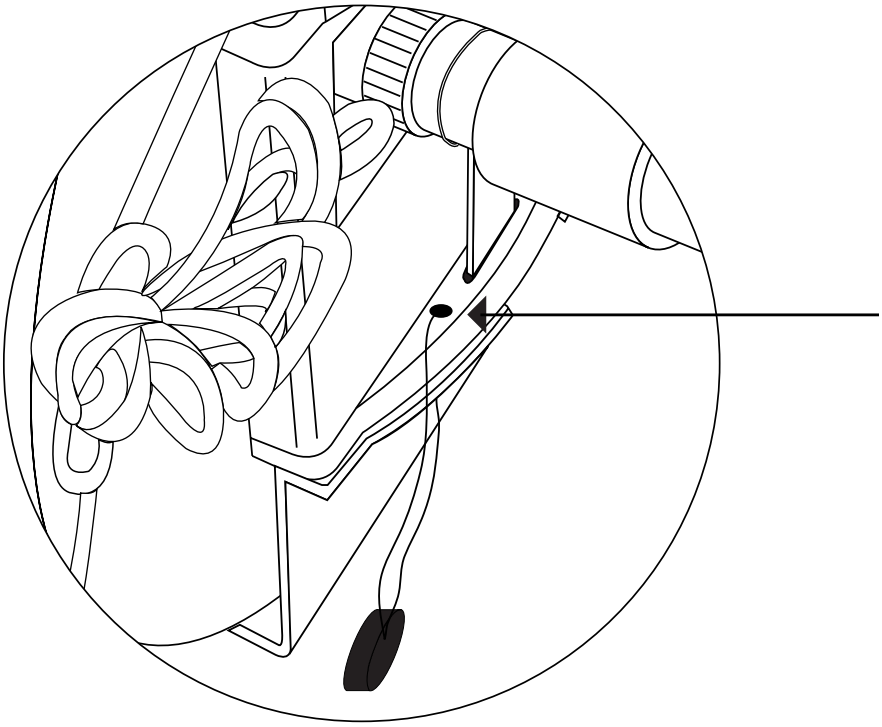
(3) Sealing

It is possible to seal the ELT on its bracket to prevent misuse.

In case of an emergency, this seal must be weak enough to be broken manually without any special tool.

ELT shall be installed with locking pin so that switch cannot be put in the "ON" position (see **Installation**).

- Install a seal using one of the two holes in the cover of the ELT and the mounting bracket.

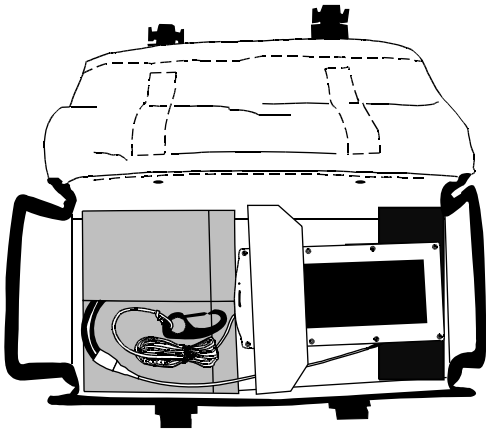


3. Removal

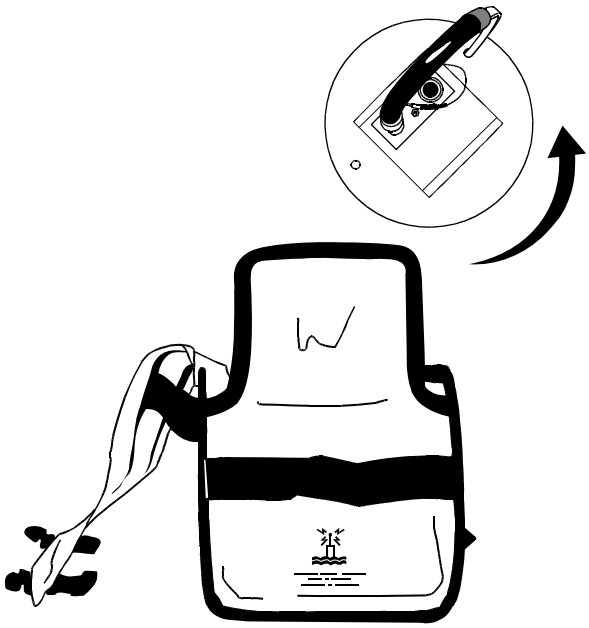
A. Deployment from carry-off bag

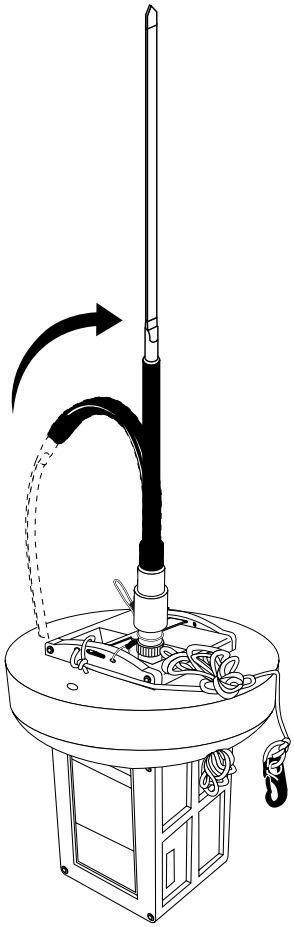
The ELT shall only be deployed in a safe area.

- Press the buckles to open the bag top cover.



- Turn the ELT sideways to release it from the wedging form.

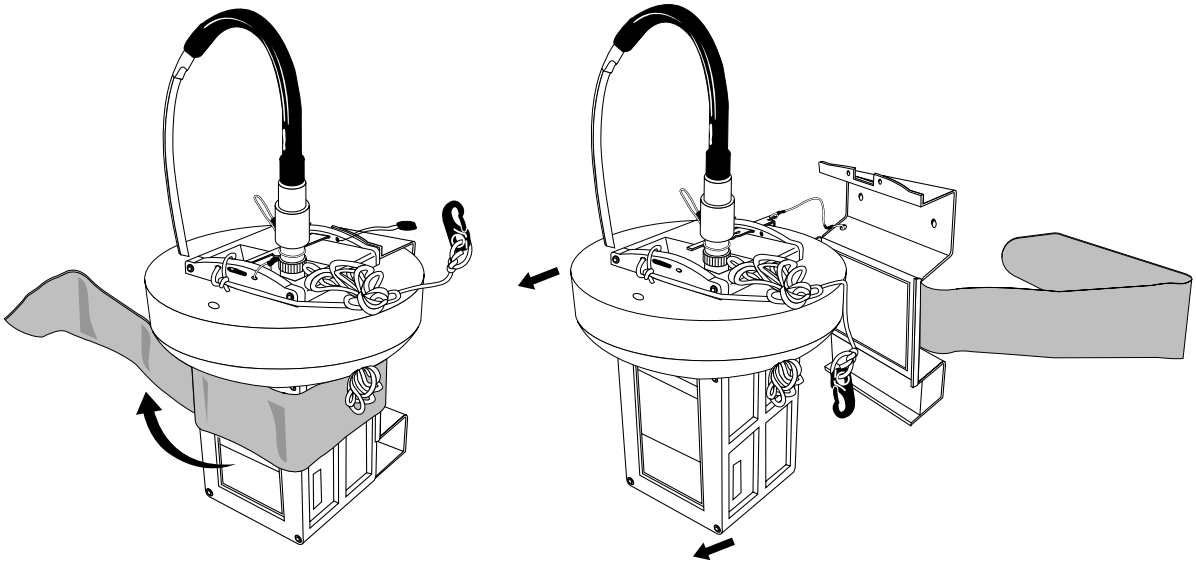




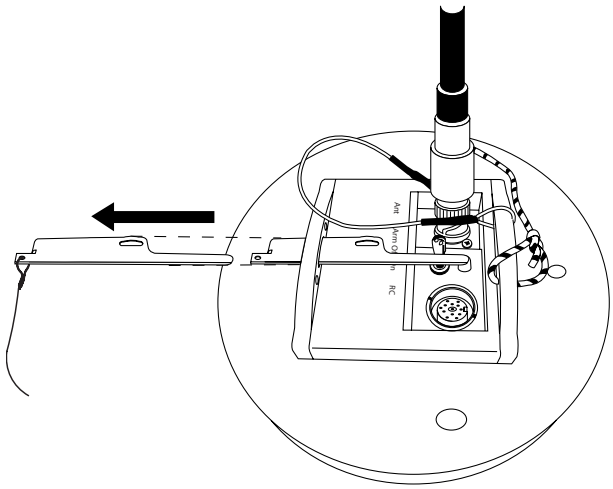
- Deploy the antenna and check that it is connected correctly.

B. Deployment from mounting bracket

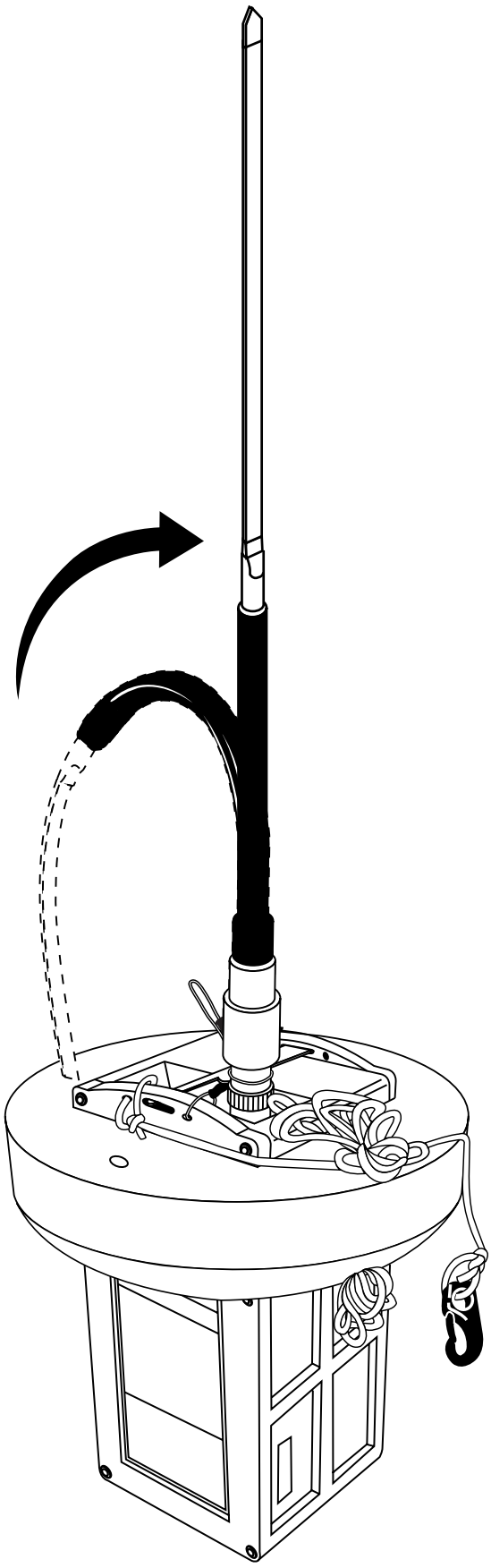
- Unfasten the Velcro® strap.
- Remove the ELT with the antenna from the bracket.



- The locking pin will be extracted from the ELT while remaining attached to the mounting bracket.
- If, unfortunately, the locking pin was not extracted, slide it to have free access to the switch.



- Deploy the antenna and check that it is connected correctly.



CHECK

1. Self-test

A. Periodicity

It is recommended by the manufacturer to test the ELT to detect any possible failure.

It is recommended to perform a self-test once a month but it **should not be done more than once a week**.

However, each self-test consumes energy from the battery. Should self-tests be carried out more often than the maximum allowed, the battery life-time might be shorter than specified.

Do not perform Self-test without the antenna connected.

B. Self-test procedure

- Check that the antenna is connected correctly.
- If a programming dongle is fitted on the bracket, connect it to the ELT.
- Switch the ELT from "OFF" to "ARM".
- The buzzer operates during the whole Self-test procedure.
- After a few seconds, the test result is displayed with the visual indicator as follows:
  - One long flash indicates that the beacon is operational and that no error conditions were found.
  - A series of short flashes indicates test failed.
- Switch back to "OFF" (or keep in the "ARM" position if the ELT is equipped with a water switch sensor).

If self-test fails, contact the distributor as soon as possible. Unless a waver is granted, flight should be cancelled.

Remark: The number of flashes gives an indication of the faulty parameter detected during the self-test.

3+1	LOW BATTERY VOLTAGE
3+2	LOW RF POWER
3+3	FAULTY VCO LOCKING (FAULTY FREQUENCY)
3+4	NO IDENTIFICATION PROGRAMMED

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TROUBLESHOOTING

1. General

Procedure for fault isolation on board uses the visual indicator of the ELT's front panel. This visual indicator is activated by a self-test capability within the ELT.

Repair and battery replacement can only be carried out by PART 145 / FAR 145 avionic workshops (or equivalent agreement according to local regulations).

2. Faults on Self-test

A. Visual Indicator

When the self-test is carried out, the number of flashes gives an indication of the faulty parameter detected during the self-test.

(1)3+1 flashes

- Low battery voltage:
  Check battery, refer to CMM 25-63-01 for repair(see note 1 below).

(2) 3+2 flashes

- Low RF power:
  Check 406 MHz power, refer to CMM 25-63-01 for repair(see note 1 below).

(3) 3+3 flashes

- Faulty VCO locking (faulty frequency):
  Check 406 MHz frequency, refer to CMM 25-63-01 for repair(see note 1 below).

(4) 3+4 flashes

- No identification programmed
  Check programming(see note 2 below).

NOTE: (1) Only services stations accredited by KANNAD can perform these repairs.
(2) Only accredited programming stations can perform programming.

3. Other faults detected

A. Buzzer

(1)Buzzer does not operate

- Refer to CMM 25-63-01 for repair(see note 1 above).

(2) Buzzer operates permanently when ELT in ARM mode

- Refer to CMM 25-63-01 for repair(see note 1 above).

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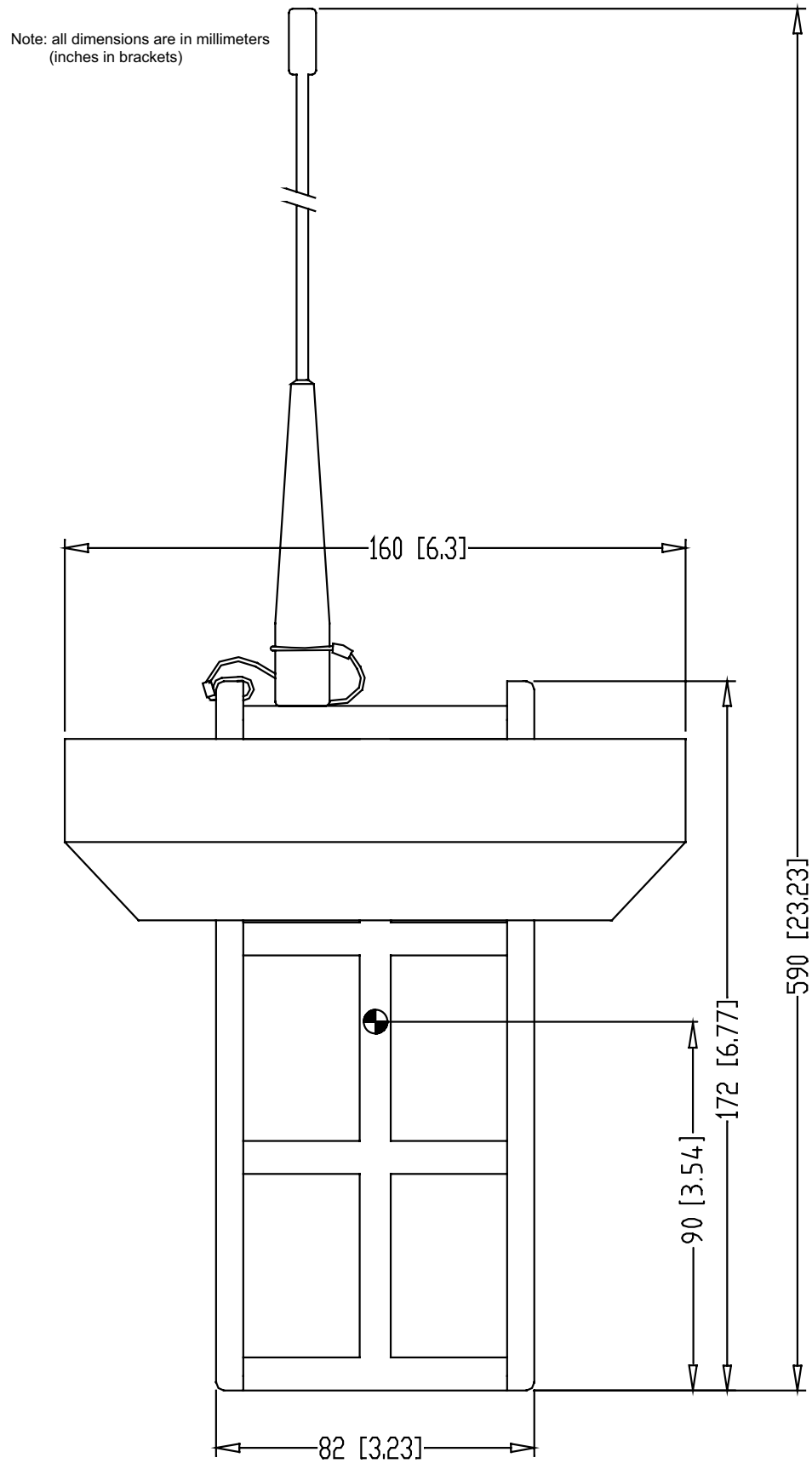
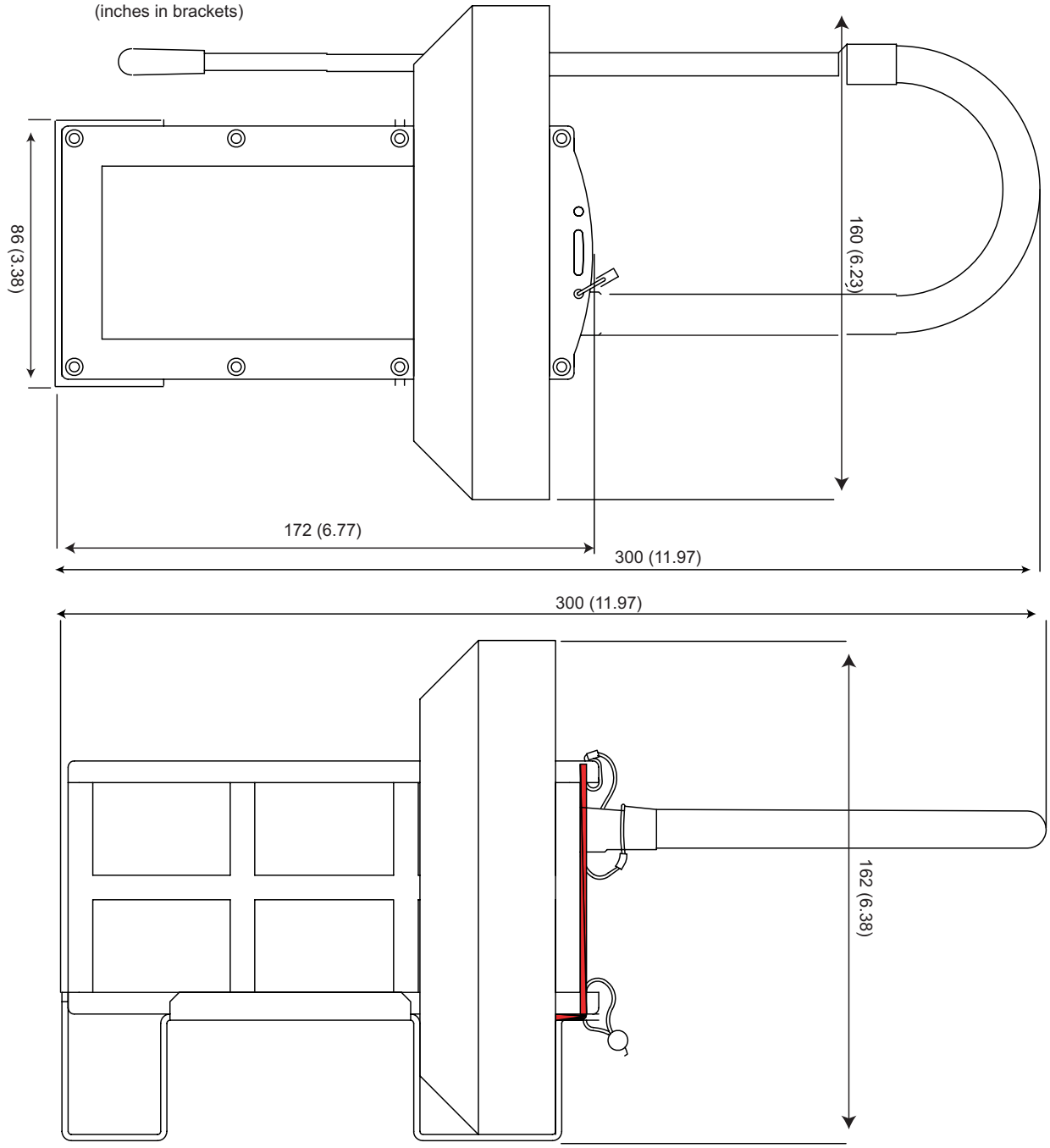
SCHEMATICS & DIAGRAMS

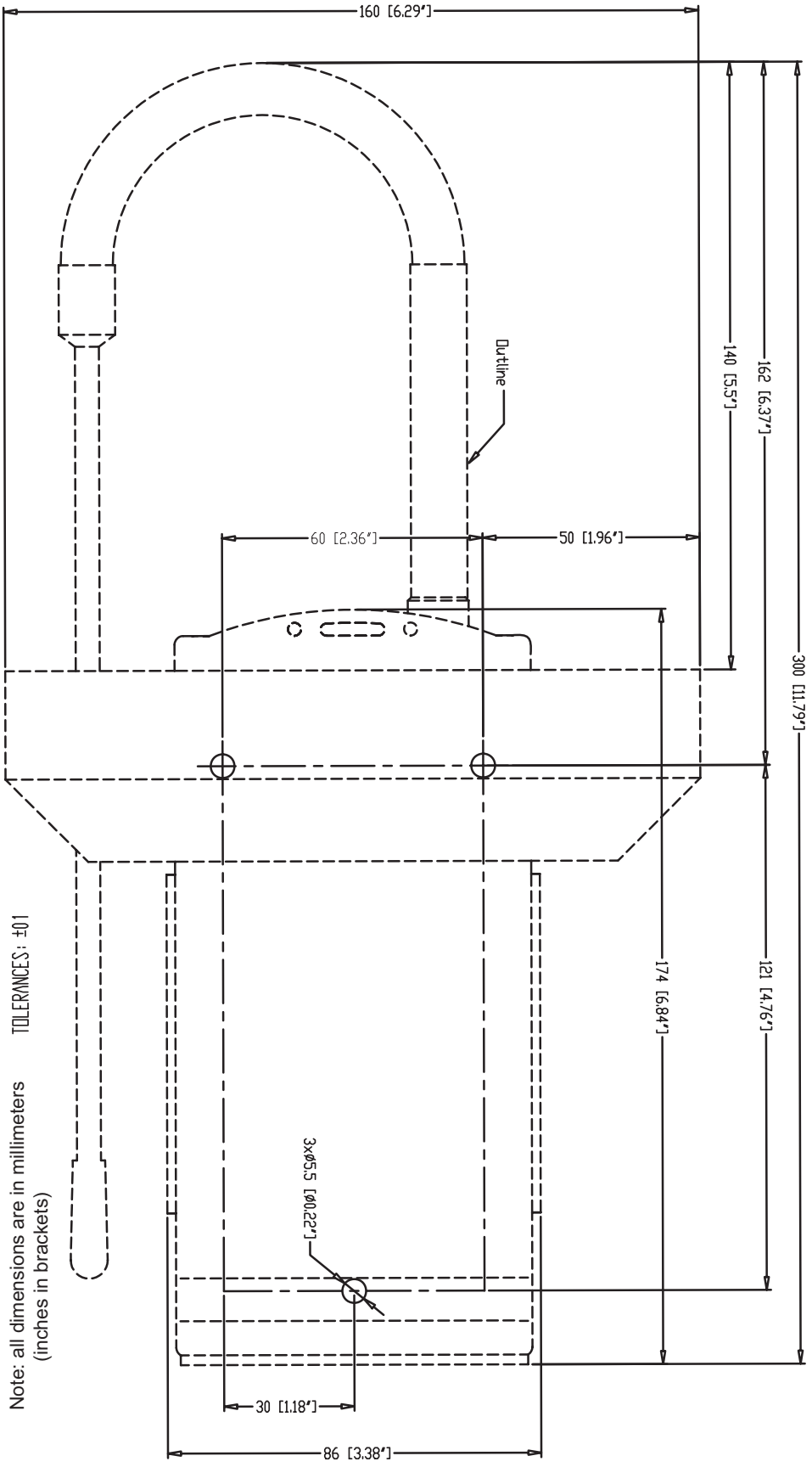
1. Outline Dimensions



Note: all dimensions are in millimeters
(inches in brackets)



2. Drilling Mask



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SERVICING

1. Maintenance Schedule

Periodic inspection and battery replacement can only be carried out by PART 145 / FAR 145 avionic workshops (or equivalent agreement according to local regulations).

A. Periodic inspection

Note: (if required by the relevant Civil Aviation Authority).

Some Civil Aviation Authorities may require the ELT is tested periodically. In this case, KANNAD recommends to check the following parameters:

- Battery voltage.
- 121.5 MHz / 243.0 MHz / 406.025 MHz transmission power.
- 121.5 MHz / 243.0 MHz / 406.025 MHz frequency.
- 121.5 MHz AM (sweep monitoring with VHF receiver).
- Number of 406 MHz transmissions (optional, programming kit required).
- Number of self-tests carried out (optional, programming kit required).
- Programmed data (optional, programming kit required).

NOTE: This functioning check can be carried out without opening the ELT.

These tests are described in Service Letter "SL S18XX502-25-12".

B. Every 6 years

Testing of the various elements of the ELT is mandatory every 6 years together with the battery replacement.

- Visual control of the housing and accessories
  Refer to CMM 25-63-01or CMM 25-63-05.
- O-ring, battery and desiccant capsule replacement
  Refer to CMM 25-63-01 or CMM 25-63-05.
- Beacon Tightness
  CMM 25-63-01 or CMM 25-63-05.
- "Testing and Fault Isolation" procedure as described in CMM 25-63-01.

NOTE:

- CMM 25-63-01: level 3 CMM, reserved for KANNAD service stations only.
- CMM 25-63-05: level 2 CMM, available upon request or on KANNAD Website.

C. Battery replacement

Battery replacement is mandatory:

- after more than 1 hour of real transmission (cumulated duration);
- before or on the battery expiration date.

Only original battery pack included in battery kit (KIT BAT 300, P/N S1820516-99) supplied by KANNAD can be installed.

KANNAD refuse all responsibility and invalidate all warranty should other packs be installed.

Battery available from any KANNAD distributor or dealer.

KANNAD

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List of distributor available on our Web site:

http://www.kannad.com

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